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New records of smut fungi. 5

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Abstract — Morphological study of an anthericolous smut fungus on *Scilla sardensis* (*Chionodoxa sardensis*) and *S. luciliae* (*Chionodoxa luciliae*) from UK has shown it to represent *Antherospora scillae.* This is also known in UK on *Scilla verna* and *S. forbesii,* new host records for this species. The new species, *Urocystis bolboschoeni* on *Bolboschoenus maritimus,* is described and illustrated from UK.

Key words — taxonomy, *Urocystidales, Ustilaginomycetes*

Introduction

In the current taxonomic scheme of the *Ustilaginomycetes,* the genus *Ustilago* is restricted to species parasitizing plants of *Poaceae* (Vánky 1999, 2002). For species on *Liliaceae* s. lat. previously referred to *Ustilago,* Ershad (2000) erected a new genus, *Vankya,* with three species: *V. heufleri* (Fuckel) Ershad on *Erythronium* and *Tulipa; V. ornithogali* (J.C. Schmidt & Kunze) Ershad on *Gagea;* and *V. vaillantii* (Tul. & C. Tul.) Ershad on *Albuca, Bellevalia, Eucomis, Hyacinthus, Muscari, Puschkinia, Scilla* (including *Chionodoxa*), and *Urginea. Vankya* was later restricted to the species on leaves and stems of liliaceous plants: *V. heufleri, V. ornithogali,* and the recently described *V. lloydiae* Vánky on *Lloydia triflora* (Ledeb.) Baker (Vánky 2009a). For the anthericolous smut fungus *Vankya vaillantii* s. lat. on plants of *Asparagaceae* (syn. *Hyacinthaceae; Liliaceae* p.p.), Bauer et al. (2008) described a new genus, *Antherospora,* with seven species: *A. albucae* (Syd. & P. Syd.) R. Bauer et al. on *Albuca, A. peglerae* (Bubák et al.) R. Bauer et al. on *Ornithogalum, A. scillae* on *Scilla bifolia* L., *A. tourneuxii* (A.A. Fisch. Waldh.) R. Bauer et al. on *Bellevalia, A. urgineae* (Maire) R. Bauer et al. on *Urginea, A. vaillantii* (Tul. & C. Tul.) R. Bauer et al.

on *Muscari,* and the cryptic species *A. vindobonensis* R. Bauer et al. on *Scilla vindobonensis* Speta. An eighth species, *A. eucomis* Vánky on *Eucomis,* was added by Vánky (2009b). The narrow host association of these anthericolous smut fungi (Bauer et al. 2008, Vánky 2009b) warranted closer study of the morphology of *Antherospora* species on *Chionodoxa* (currently treated as members of *Scilla*). The result of this study is presented here.

In June 2010, two specimens of *Urocystis* in leaves of *Bolboschoenus maritimus* were collected by Mr N.W. Legon in South Devon, England. No *Urocystis* has been previously recorded on *Bolboschoenus* nor on plants of related genera *(Scirpus, Holoschoenus, Isolepis, Schoenoplectus, Trichophorum)*. We consider those specimens as belonging to a new species, described below.

Material & methods

Dried specimens from the mycological collection of the Royal Botanic Gardens, Kew [K(M)] were examined under light (LM) and scanning electron (SEM) microscopes. For LM observations, spores were mounted in lactophenol solution on glass slides, gently heated to boiling point to rehydrate the spores, and then cooled. Spore measurements are given in the form: min–max [mean ± 1 standard deviation]. In the description, the total number of spores (n) from all collections (x) measured are given in the form '(n/x)'. For SEM, spores were attached to specimen holders by double-sided adhesive tape and coated with gold with an ion sputter. The surface structure of spores was observed at 10 kV and photographed with a JEOL JSM-5510 scanning electron microscope.

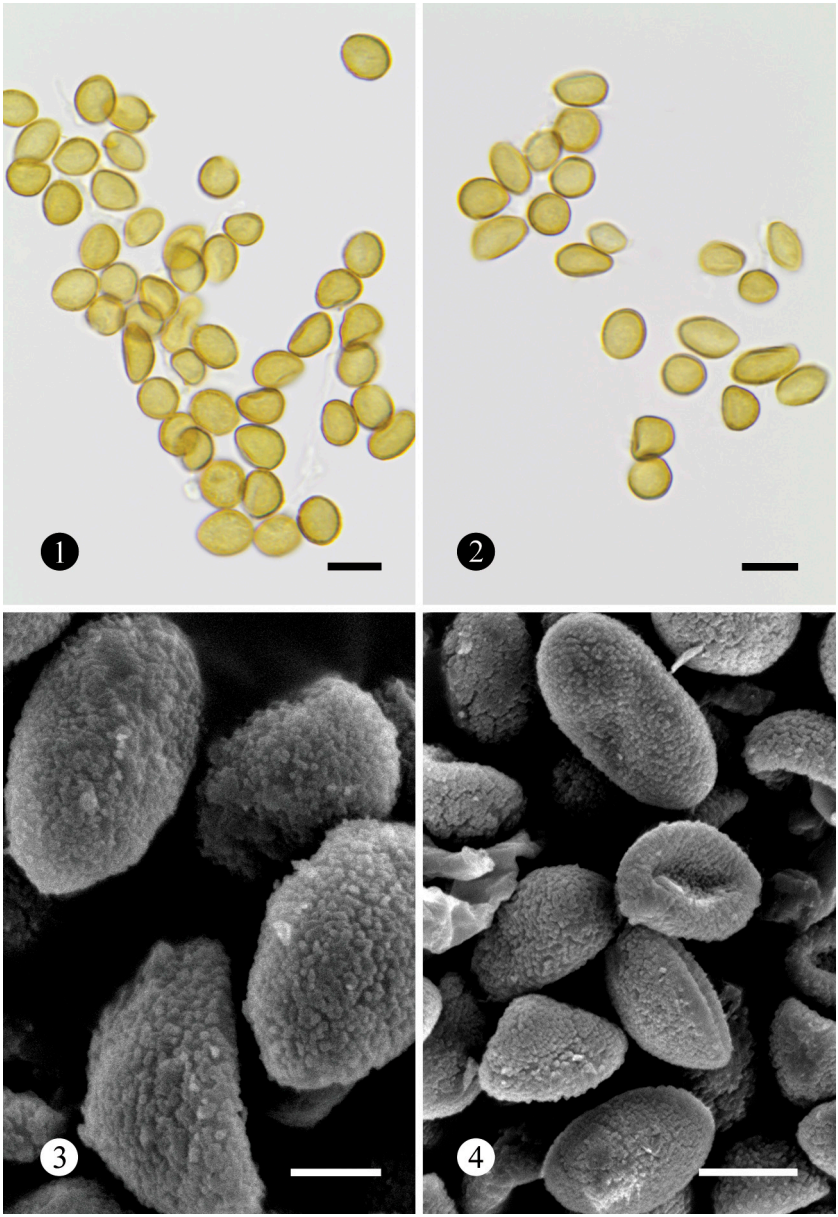
Taxonomy

Antherospora scillae (Cif.) R. Bauer et al., Mycol. Res. 112: 1301, 2008. Figs 1–4

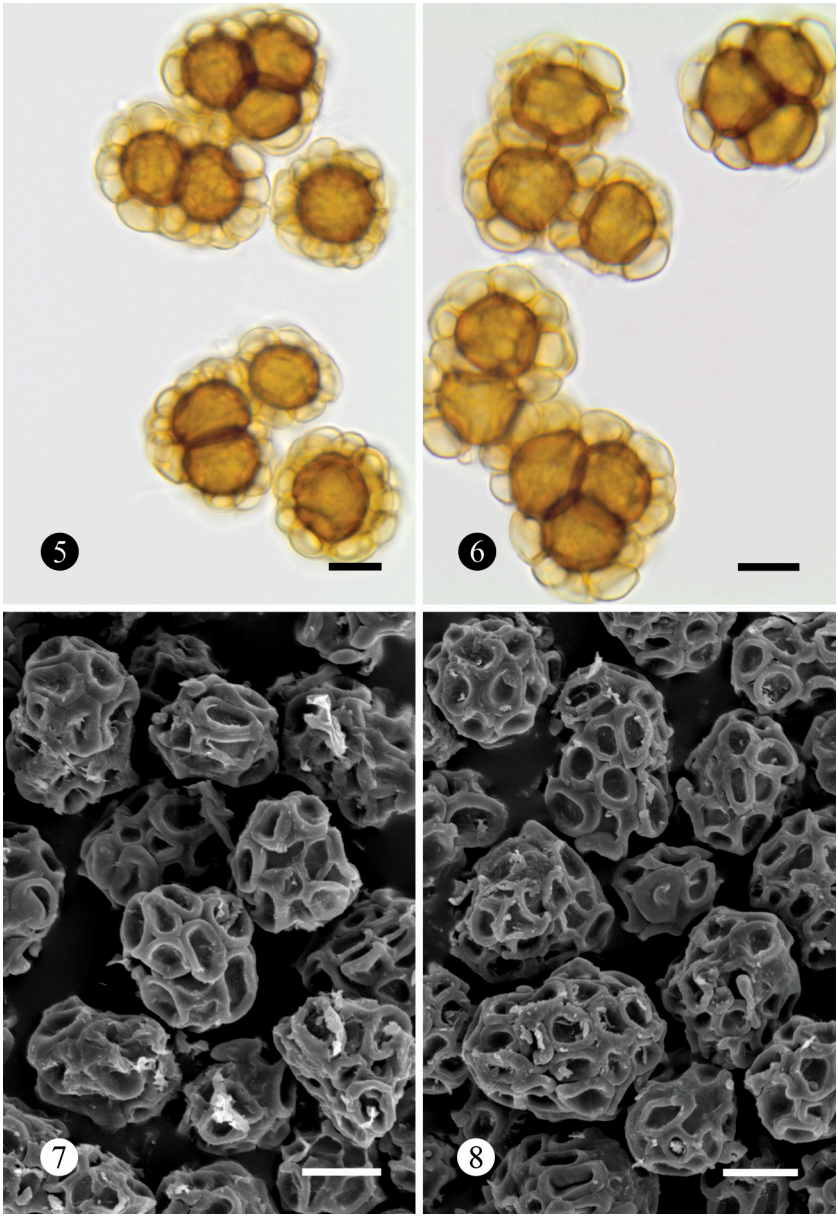
Sori in the anthers and on the surface of anther filaments. Spore mass powdery, dark olivaceous brown. Infection systemic, all anthers are infected. Spores variable in shape, globose, subglobose, broadly ellipsoidal, ovoid, elongated or slightly irregular, sometimes pyriform, 7–12.5 × 6.5–9.5 [9.4 ± 1.2 × 7.8 ± 0.8] µm ($n/_2$ = 200), light olivaceous brown; wall even, 0.7–1.0 µm thick, densely verruculose.

Specimens examined — On ***Scilla sardensis*** (Whittall ex Barr & Sugden) Speta: **UK, ENGLAND, Surrey,** Kew, Royal Botanic Gardens, 21 April 1947, leg. G.M. Waterhouse [ex herb. University of Sheffield, no. 764; IMI 15342] (as *Ustilago vaillantii* on *Chionodoxa sardensis* Whittall ex Barr & Sugden, K(M) 116304). — On ***Scilla luciliae*** (Boiss.) Speta: **UK, ENGLAND, Surrey,** Kew, Royal Botanic Gardens, near Lion Gate, 23 March 1954, leg. R.W.G. Dennis (as *Ustilago vaillantii* on *Chionodoxa luciliae* Boiss., K(M) 69569).

Comments — The study of this fungus on these two hosts was provoked by the high host specialization amongst *Antherospora* species infecting *Scilla* with the presumption that *A. scillae* is restricted to *Scilla bifolia* as suggested by Bauer et al. (2008: 1302). Bauer et al. (2008) described both *Antherospora scillae* on *Scilla bifolia* and *A. vindobonensis* on *Scilla vindobonensis* as having



Figs 1–4. Spores of *Antherospora scillae*. 1–2 on *Scilla luciliae* (K(M) 69569) in LM, 3 on *S. sardensis* (K(M) 116304) in SEM, 4 on *S. luciliae* (K(M) 69569) in SEM. Scale bars: 1–2 = 10 µm, 3 = 2 µm; 4 = 5 µm.



Figs 5–8. Spores of *Urocystis bolboschoeni* on *Bolboschoenus maritimus*. 1–2 in LM (holotype), 3 in SEM (K(M) 166454), 4 in SEM (holotype). Scale bars: 5–8 = 10 μm.

spore walls with a thickness of ca 0.5 µm. The specimens we examined on *Scilla sardensis* and *S. luciliae* have spores with a thicker wall (0.7–1.0 µm wide), and it seemed warranted to make additional observations of the spore wall on *S. bifolia*. We found that the spore wall thickness of two specimens on *S. bifolia* measured 0.7–0.9 µm (Vánky *Ustilag.* exs. no. 57) and 0.8–1.1 µm (SOMF 19206). Additionally, Vánky (2009b) cited a spore wall thickness of 0.8–1.5 µm for *Antherospora scillae*. Our spore measurements from four specimens of *A. scillae* on *Scilla bifolia* (Vánky *Ustilag.* exs. no. 57; SOMF 2859, 2888, & 19206) (7–14.5 × 6.5–10 [9.8 ± 1.1 × 8.5 ± 0.7] µm; $n/_4 = 350$) resembled those of the British specimens we examined.

Additional specimens examined — On ***Scilla bifolia:*** **HUNGARY,** prope pag. Makád insulae Csepel sziget, ca. 98 m, 6 April 1965, S. Tóth (Vánky *Ustilag.* exs., no. 57); **BULGARIA,** l.d. Papazova Korija prope urb. Elhovo, 21 March 1962, C. Hinkova (SOMF 2859); l.d. Gorna Topčija, distr, Jambol, 22 March 1961, C. Hinkova SOMF 2888); Pirin Mts, Sinanitsa, ca. 2000 m, 24 May 1985, C.M. Denchev (SOMF 19206).

Currently, there is no molecular phylogenetic inference for distinguishing the anthericolous smut fungus on *Scilla sardensis* and *S. luciliae* from that on *S. bifolia*. Because no morphological differences were found, we identified *Antherospora scillae* as the fungus on the British specimens that we examined.

This anthericolous smut fungus known in UK on *Scilla verna* Huds. (several collections) has been recently collected also on *S. forbesii* (Baker) Speta (≡ *Chionodoxa forbesii* Baker) [K(M) 169982]. *Scilla sardensis, S. luciliae, S. verna,* and *S. forbesii* are new host records for *Antherospora scillae*.

Urocystis bolboschoeni Denchev, T. Denchev, Spooner & Legon, **sp. nov.** Figs 5–8

MycoBank MB 561704

Sori in foliis et vaginis foliorum strias formati. Glomeruli sporarum 16–40 × 14.5–28.5 µm, e sporis 1–3 (–5) compositi [numeri sporarum: 1 = 44.6%, 2 = 39.2%, 3 = 11.2%, 4 = 4.2%, 5 = 0.8%], strato cellularum sterilium perfecte circumdatis composite. Sporae 12.5–18.5 × 10–15 [15.2 ± 1.1 × 12.7 ± 1.1] µm, rufobrunneae, pariete 0.6–0.9 µm crasso.

Type on *Bolboschoenus maritimus* (L.) Palla: UK, England, South Devon, Budleigh Salterton, Otter Estuary, 29 June 2010, leg. N.W. Legon, as *Urocystis* sp. (**holotype,** K(M) 166455).

Etymology: the name refers to the host genus.

Sori in leaves and leaf sheaths between the veins, as streaks, sometimes confluent, initially covered by the epidermis, rupturing longitudinally to expose a powdery, dark reddish brown mass of spore balls. Spore balls subglobose to ellipsoidal or slightly irregular, composed of 1–3 (–5) central teliospores [1 = 44.6%, 2 = 39.2%, 3 = 11.2%, 4 = 4.2%, 5 = 0.8%; $n/_2 = 950$] and a continuous layer of peripheral sterile cells; 16–25 × 14.5–22.5 µm [with 1 teliospore], 21–33.5 × 15.5–24.5 µm [with 2 teliospores], 25–40 × 17–28.5 µm [with 3 teliospores]. Sterile cells broadly elliptical, elliptical, suborbicular or ovate

in outline, or collapsed, sometimes slightly irregular, 5–11.5 µm long, pale or yellowish, wall 0.6–1.0 µm thick, smooth. Spores globose, subglobose, broadly ellipsoidal or ovoid, 12.5–18.5 × 10–15 [15.2 ± 1.1 × 12.7 ± 1.1] µm ($n/_2 = 200$), medium reddish brown; wall 0.6–0.9 µm thick, finely verruculose.

Distribution — On *Cyperaceae: Bolboschoenus maritimus,* Europe (England). Known only from the type locality.

Additional specimens examined — On ***Bolboschoenus maritimus:*** **UK, England, South Devon,** Budleigh Salterton, Otter Estuary, 22 June 2010, leg. N.W. Legon (as *Urocystis* sp., K(M) 166454); 12 May 2011, leg. N.W. Legon (K(M) 170764).

Comments — On *Cyperaceae* three *Urocystis* species have been described: (i) *U. fischeri* Körn. ex G. Winter on species of *Carex,* with type on *C. acuta* L. from Germany; distributed in Europe, Asia, and North America (sori in leaves and culms, spore balls 20−40 µm long, composed of 1−3 (−4) fertile spores); (ii) *U. littoralis* (Lagerh.) Zundel on *Carex maritima* Gunnerus from Norway (sori in leaves, spore balls 25−50 µm long, composed of (1−) 2−6 (−9) fertile spores); and (iii) *U. chorizandrae* Cunningt. et al. on *Chorizandra enodis* Nees from Australia (sori in leaves and sterile culms, spore balls 25−50 µm long, composed of 1−5 (−8) fertile spores) (Vánky & Shivas 2003, Vánky 2009c).

It is remarkable that no smut has been previously reported on this common and widely distributed host species.

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